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IS 11098 (1992): Automotive Vehicles - Steering Column Mounted Combination Switches [TED 11: Automotive Electrical Equipment]



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भारतीय मानक
स्वचल वाहन — स्टीयरिंग कॉलम बहुक्रिया स्विच — विशिष्ट
(पहला पुनरीक्षण)

Indian Standard

AUTOMOTIVE VEHICLES — STEERING
COLUMN MOUNTED COMBINATION
SWITCHES — SPECIFICATION

(First Revision)

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FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Electrical Equipment Sectional Committee had been approved by the Transport Engineering Division Council.

This Indian Standard was first published in 1984. The revision has been taken up due to considerable technological advancements made in the switch combinations mounted in the steering column other than for lighting purposes. The scope is also being enlarged to cover heavy commercial vehicles above 4 000 kg.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules of rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

AMENDMENT NO. 1 AUGUST 1995

TO

IS 11098:1992 AUTOMOTIVE VEHICLES - STEERING COLUMN
MOUNTED COMBINATION SWITCHES (*first revision*)

(Page 1, Clause 3.4, Title) - Substitute the following for the existing:

"Head light flash control"

(Page 2, Clause 4.1.c, first line) - Substitute "two or more positions (depending on design)" for "two or three position (depending on the use)".

(Page 2, Clause 4.1.e) - Substitute the following for the existing:

"Indication of 'hazard' by flashing all direction indicating lights. The switch can also be independently operated".

(Page 2, Clause 4.2) - Add the following at the end:

"The current rating limit specified can be waived when a relay is intended to be used in the circuit".

(TED 11)

Indian Standard

AUTOMOTIVE VEHICLES — STEERING COLUMN MOUNTED COMBINATION SWITCHES — SPECIFICATION

(First Revision)

1 SCOPE

1.1 This standard covers the basic mechanical and electrical requirements and methods of tests for combination switches mounted on steering column of automotive vehicles, such as passenger cars, light commercial vehicles and heavy commercial vehicles. However, the load values given in 6.5 are not applicable to heavy commercial vehicles.

1.2 This standard does not apply to two wheelers.

2 REFERENCES

2.1 The following Indian Standards are necessary adjuncts to this standard:

IS No.	Title
1951 : 1961	Polyvinylchloride sleeving for electrical purpose
2465 : 1984	Cables for motor vehicles (<i>second revision</i>)
2577 : 1974	Cartridge fuse-links for automobiles (<i>first revision</i>)
9000	Series of standards on methods of environmental tests
9237 : 1979	Symbols for controls, indicators and tell tales for road vehicles (<i>under revision</i>)
10250 : 1982	Severities for environmental tests for automotive electrical equipment

3 TERMINOLOGY

For the purpose of this standard, the following definitions shall apply.

3.1 Combination Switch

A switch which combines two or more functions with each lever controlling one or more than one function. The functions shall be the operation of :

- a) head lights, parking lights, side lights, hazard warning lights;
- b) direction indicators; and
- c) other functions, such as horns, wind screen wipers and washers.

3.2 Direction Indicator

A lighting device to show in which direction the driver intends to turn by giving a flashing light on the side of the vehicle towards which the turn will be made. The definition does not include:

- a) switchgear, and
- b) additional indicators.

3.3 Headlight Beam Control

Driver controlled device to select driving (main) or passing (dip) beams of head lights.

3.4 Headlight Flasher Control

The control is intended to momentarily flash 'on' driving (main) beam of all head lights.

NOTE — The control is intended for operation, while approaching the vehicles ahead of the driving vehicle to indicate the presence of the vehicle as an alternate to an audible warning of approach and not to indicate priority of movement or any other signal of intention.

3.5 Self-Cancelling Direction Indicator Switch Mechanism

The mechanism which returns the operating lever of direction indicator switch to its natural position as described in the following sequence of operation:

- a) The driver has manually shifted the direction indicator lever in the intended direction of turning or changing of the lane while overtaking.
- b) The driver returns the steering wheel to its straight ahead position.
- c) The mechanism snaps back the lever to its neutral position.

3.6 Response to Erroneous Use in Driving

If the operating lever is wrongly shifted and the driver turns the steering wheel to the side opposite to the signalled side, the steering wheel rotation shall prompt the mechanism to snap back to neutral position and cancel the wrong signalling.

3.7 Over-Riding Control

The mechanism which has an over-riding manual control for all functions provided.

3.8 Type Tests

Tests carried out to prove conformity with specification. These are intended to prove the general qualities and design of a given type of switch.

3.9 Acceptance Test

Tests carried out on samples taken from a lot for the purpose of acceptance of the lot.

3.10 Routine Tests

Tests carried out on each switch to check requirements which are likely to vary during production.

4 DESIGN AND CONSTRUCTION

4.1 The switches shall be operated by a lever(s) which shall operate as under:

- a) Control of direction indicator through the operation of a lever which operates in a plane parallel to the steering wheel. The direction of movement shall be in the intended direction of turning.
- b) Control of the head lamp beam possibly provided with flasher control through the operation of a lever which operates in the plane at right angles to the plane of the steering wheel. The lever(s) may also have rotary operation for headlights/parking lights/off positions as well as wiper with washer control.
- c) Two or three position (depending on the use) wind screen wiper control lever, possibly provided with windshield washer electric pump control by pulling lever towards steering wheel or by pushing the knob.
- d) Horn control possibly by pushing the knob or any one of the control levers as above.
- e) Indication of 'hazard' by flashing all side lights, parking lights and direction indicating lights. The switch can also be independently operated.

4.2 The current rating of the individual switch of the combination shall not be less than 10 amperes (dc).

4.3 The functions of direction indication, head lamp beam selection, wiper motor and windshield washer electric pump control as well as horn control shall be offered as available choices of operating control lever, knob, push button, etc, and shall be left to the agreement between the purchaser and the manufacturer.

4.4 The symbols and tell-tales for the controls shall be in accordance with IS 9237 : 1979.

5 SAMPLING

5.1 Ten samples shall be submitted for testing together with relevant data. These shall be tested according to the test schedule given in Annex A. The testing authorities may issue a type approval certificate, if the

combination switches are found to comply with the requirements of tests given in 6.1.1.

5.2 In case of failure in one or more type tests the testing authority may call for fresh samples, not exceeding twice the number of original samples and subject them to the test(s) in which failure occurred. During repeat tests if no failure occurs then the samples may be considered to have complied with the test requirements.

6 TESTS

6.1 Classification of Tests

6.1.1 Type Tests

The following shall constitute type tests :

- a) Visual examination (see 6.2),
- b) Test for smooth operation (see 6.3),
- c) Dimensional check (see 6.4),
- d) Mechanical performance test (see 6.5),
- e) Contact voltage drop test (see 6.6),
- f) Insulation resistance test (see 6.7),
- g) High voltage (flash) test (see 6.8),
- h) Endurance test (see 6.9),
- j) Continuous operation test (see 6.10),
- k) Short circuit test (see 6.11),
- m) Vibration test (see 6.12),
- n) Dry heat test (see 6.13),
- p) Damp heat cycling test (see 6.14),
- q) Cold test (see 6.15),
- r) Corrosion resistance test (see 6.16),
- s) Dust test (see 6.17),
- t) Drop and topple test (see 6.18), and
- u) Water spray test (optional) (see 6.19).

6.1.2 Acceptance Tests

The following shall constitute acceptance tests :

- a) Visual examination (see 6.2),
- b) Test for smooth operation (see 6.3), and
- c) Contact voltage drop test (see 6.6).

NOTE — The number of samples for acceptance tests and the criteria for acceptance shall be as agreed between the purchaser and the manufacturer. However, a recommended plan of sampling is given in Annex B.

6.1.3 Routine Tests

The following shall constitute routine tests :

- a) Visual examination (see 6.2),

- b) Test for smooth operation (see 6.3), and
- c) High voltage (flash) test (see 6.8).

6.2 Visual Examination

The switch shall be examined for workmanship and finish and shall be free from injurious flaws or other defects.

6.3 Test for Smooth Operation

The switch shall operate smoothly with positive operation in each position. It shall not remain in the intermediate position. This shall preferably be tested with the normal electrical load connected at the rated voltage.

6.4 Dimensional Check

The switch shall conform to the dimensions recommended by the manufacturer.

6.5 Mechanical Performance Test

6.5.1 General

6.5.1.1 The lever movement from one position to another shall be smooth and positive.

6.5.1.2 In two-position levers, the movement shall be possible with 4 to 8 N load applied to the lever end.

6.5.1.3 In three-position levers, the movement to the central position shall be possible with 4 to 8 N load and to the two end positions with a load value 50 percent of that measured for the central position (loads shall be applied on lever end).

6.5.1.4 The area around the control lever dead point (the stretch within which the control lever can remain balanced between two adjacent positions) shall not have an angular amplitude greater than 5°; in any case, in this angular amplitude, the circuit shall neither open nor close.

6.5.1.5 By applying a bending load at the lever end and along any direction, the following results shall be obtained:

- a) With 10 N load, the lever end shall not bend more than 25 mm;
- b) With 40 N load, the lever shall not suffer permanent deformation; and
- c) When the load is increased to 50 N, a permanent deformation without breakage shall be permissible.

6.5.1.6 The knob grip and the lever shall withstand one Nm torque without deformation or failure.

6.5.2 Characteristics of Self-Cancelling Direction Indicator Switch with Release Mechanism

6.5.2.1 While keeping the steering wheel in straight ahead drive position, and the lever shifted to right and

left wheel rotation angle (in the same direction as the lever), starting from the said position which is necessary to perform automatic release, shall be 70° or as agreed to between the manufacturer and the purchaser.

6.5.2.2 In case of wrongly shifted lever in the opposite direction to that of the steering wheel turn, the steering wheel rotation shall interrupt the circuit erroneously closed, after an angle not less than 40° or as agreed to between the manufacturer and the purchaser.

6.5.2.3 If the lever is held in the indicating position, inspite of the steering wheel being turned through the cancelling position, the force needed to restrain the lever shall be within 4 to 13 N.

6.5.3 Characteristics of Headlight Switches and Self-Cancelling Headlight Flashing Control

In the range of lever shifting in which the head lamp lighting occurs, the time period of contemporaneous opening of the consecutive circuits shall be extremely short and it shall not be possible to obtain such a condition steadily when moving the lever normally.

6.5.4 Characteristics of Horn Control Switches

6.5.4.1 A force of 200 N shall be applied to the horn switch to check its mechanical strength against accidental/sudden high forces.

6.5.4.2 The horn shall be operated with a maximum force of 50 N for 1 000 application to ensure its mechanical strength. After the test the switch shall satisfy the requirements of contact voltage drop test specified in 6.6.

6.5.4.3 The load required to close the electric circuit shall be between 4 to 10 N.

6.5.5 If the combination switch is supplied complete with the connecting cables, the cables shall conform to IS 2465 : 1984 and shall be covered with PVC sleeves conforming to IS 1951 : 1961.

6.6 Contact Voltage Drop Test

6.6.1 Voltage drop on contacts of each switch (with the exclusion of the drop due to connecting cables) with a current of 10 A shall not be more than 80 mV when new and not more than 150 mV after endurance test.

6.6.2 For standard inspection of devices supplied with connecting cables, voltage drop measurement shall be taken on connecting cable ends. In this case, it is necessary to add to the voltage drop specified in 6.6.1, the drop due to cables and clinched junctions, if any. This drop shall be computed for 10 A current value, as follows:

1 mm ² section cables	Not more than 20 mV for each 10 cm of cable length
1.5 mm ² section cables	Not more than 15 mV for each 10 cm of cable length

2.5 mm ² section cables	Not more than 10 mV for each 10cm of cable length
Clinched junctions	Not more than 3 mV for each terminal junction

6.6.3 In case of doubt, the values shall comply with those specified in 6.6.1.

6.6.4 All switch designs shall have current carrying paths of adequate cross section such that in case of short circuit leading to fuse blowing, the switch shall not suffer deterioration of any of the characteristics and in particular voltage drop as per **6.6.1**. A standard 10 A fuse conforming to IS 2577 : 1974 may be blown five times in each circuit to check compliance to this test.

6.7 Insulation Resistance Test

The insulation resistance between the insulated terminals and the main body shall not be less than one megohm, when measured with a dc potential of 500 volts, at the prevailing atmospheric temperature and humidity conditions.

6.8 High Voltage (Flash) Test

The switch shall be subjected to a flash test with 240 V ac rms for five seconds at any available supply frequency between 40 to 60 Hz, applied between each of the insulated terminal and the body, at the prevailing atmospheric temperature and humidity conditions.

The switch shall withstand this test without arcing or puncture of the dielectric material.

6.9 Endurance Test

6.9.1 General Test Conditions

6.9.1.1 The ambient temperature shall not be more than 40°C.

6.9.1.2 Each switch/lever shall be operated with specified electrical load depending upon the application as agreed between the manufacturer and the purchaser. For direction indicator switch testing, the flasher unit is not to be included in the circuit.

6.9.1.3 During the test, voltage shall be maintained at 14 ± 0.5 volts and 28 ± 1 volts for operation systems of 12 V and 24 V respectively.

6.9.1.4 The test shall be conducted at the rate of 12 to 15 complete movements per minute:

Travel time (time from one position to next position)	0.1 s, <i>Min</i> 0.5 s, <i>Max</i>
Dwell time (time in each position)	0.4 s, <i>Min</i>

NOTE — This test cycle is not applicable to horn control switch endurance test.

6.9.1.5 At the end of the test each switch shall function satisfactorily and shall meet the requirements of 6.3, 6.6 to 6.8.

6.9.2 Self-Cancelling Direction Indicator Switch

Endurance Test

The following number of shifting movements shall be performed using a release mechanism reproducing the driving conditions:

- 80 000 open and close cycles (turning from off-left turn, off-right turn-off constitutes one cycle movement) with automatic return;
- 10 000 close and open cycles both for turning to right and left with the control lever itself (simulating the lever operated manually); and
- 10 000 close and open cycles (both for turning to right and left) moving the steering wheel in direction opposite to that of the lever and locking the latter in the inserting position ('anti-jam' operations).

6.9.3 Head Light Beam Control Switch Endurance Test

The following number of movements shall be performed:

100 000 cycles, shifting the lever from one end position to the other (each cycle consists of one movement onward and one backward).

6.9.4 Head Light Flasher Control Switch Endurance Test

The following number of movements shall be performed:

100 000 cycles, movements consisting of pulling the lever towards the steering wheel (flashes).

6.9.5 Wind Screen Wiper Switch Endurance Test

The following number of movements shall be performed:

- a) 100 000 cycles, shifting the lever from one end position to the other (each cycle consists of one movement onward and one movement backward); and
- b) 100 000 cycles/movements consisting of pulling the lever towards the steering wheel or by pushing the knob for wind shield washer pump control.

6.9.6 Horn Control Switch Endurance Test

After suitably mounting the device, 100 000 operating cycles shall be performed with an inductive electrical load in parallel drawing 120 percent of the rated current required for a particular application and with an applied force of 20 N. The sequence of operation shall be one second closed and three seconds open.

6.10 Continuous Operation Test

The switch shall be 'ON' continuously for a period of one hour for each function at a load current of (a) 10A for head lamp, indication lamp horn switch (b) 5A for wiper motor switch and 2A for wind shield washer motor switch.

At the end of the test, there shall be no obvious damage to any part and also shall pass the tests of 6.3, 6.6 and 6.7.

6.11 Short Circuit Test

The test shall be conducted in the closed position of contactors for each function of the switch. This shall be carried by short circuiting the load with 10A standard fuse conforming to IS 2577 : 1974 in series with the circuit.

A fully charged battery shall be used for this test. This test shall be repeated 10 times at one minute interval.

At the end of the test, there shall be no obvious damage to any part of the switch and it also shall pass the tests of 6.3, 6.6 and 6.7.

6.12 Vibration Test

The test shall be conducted according to 4.2 of IS 10250 : 1982 under the following conditions :

Frequency range	10-55-10 Hz
Displacement, amplitude	0.75 mm
Total duration	3 h

At the end of the vibration test the switch shall be examined for any evidence of damage and shall pass the test of 6.3, 6.6 and 6.7.

6.13 Dry Heat Test

The test shall be conducted according to 4.2 of IS 10250 : 1982 under the following conditions:

Temperature	85° ± 2°C
Duration	4 h

After completion of the test the switch shall be subjected to tests at 6.3 and 6.6 and shall pass these tests. Parts of non-metallic materials shall not show any breakages/deformations.

6.14 Damp Heat (Cycling Test)

The test shall be conducted according to 4.3 of IS 10250 : 1982.

The number of conditioning cycles shall be seven.

At the end of conditioning, the switch shall be subjected to insulation resistance test given in 6.7.

6.15 Cold Test

The test shall be conducted according to 4.4 of IS 10250 : 1982 under the following conditions :

Temperature	-10° ± 3°C
Duration	2 h

After completion of the test, parts of non-metallic material shall not show any breakages/deformations. The switch shall meet the requirements of tests of 6.3, 6.6 and 6.7.

6.16 Corrosion Resistance Test

The test shall be conducted according to 4.8 of IS 10250 : 1982.

After removal from the salt spray chamber, the sample shall not show any sign of corrosion.

6.17 Dust Test

This test shall be carried out according to 4.6 of IS 10250 : 1982.

At the end of the test, the switch shall pass the tests of 6.3, 6.6 and 6.7.

6.18 Drop and Topple Test

This test shall be carried out according to 4.10 of IS 10250 : 1982. The drop height shall be 1 m.

At the end of the test, the switch shall pass the tests stipulated in 6.3, 6.6 and 6.7.

6.19 Water Spray Test (Optional)

When agreed to between the purchaser and the supplier, a water spray test in accordance with 4.13 of IS 10250 : 1982 may be carried out.

ANNEX A

(Clause 5.1)

TEST SEQUENCE FOR TYPE APPROVAL

Clause No.	Test	Sequence Sample No.									
		1	2	3	4	5	6	7	8	9	10
6.2	Visual examination	X	X	X	X	X	X	X	X	X	X
6.3	Test for smooth operation	X	X	X	X	X	X	X	X	X	X
6.4	Dimensional check	X	—	—	—	—	—	—	—	—	—
6.5	Mechanical performance test	—	X	X	X	X	—	—	—	—	X
6.6	Contact voltage drop test	—	X	X	X	X	X	X	X	X	X
6.7	Insulation resistance test	—	X	X	X	X	X	X	X	X	X
6.8	High voltage (flash) test	—	X	—	—	—	—	—	—	—	—
6.9	Endurance test	X	X	X	—	—	—	—	—	—	—
6.10	Continuous operation test	X	X	X	—	—	—	—	—	—	—
6.11	Short circuit test	—	—	—	X	—	—	—	—	—	—
6.12	Vibration Test	—	—	—	X	—	—	—	—	—	—
6.13	Dry heat test	—	—	—	—	X	—	—	—	—	—
6.14	Damp heat (cycling) test	—	—	—	—	—	X	—	—	—	—
6.15	Cold test	—	—	—	—	—	—	X	—	—	—
6.16	Corrosion resistance test	—	—	—	—	—	—	—	X	X	—
6.17	Dust test	—	—	—	—	—	—	—	—	—	X
6.18	Drop and topple test	—	—	—	—	—	—	—	—	—	X
6.19	Water spray test (optional)	—	—	—	—	—	—	—	—	—	—

ANNEX B

(Clause 6.1.2)

RECOMMENDED PLAN OF SAMPLING FOR ACCEPTANCE TESTS

B-0 GENERAL

B-0.1 If statistical quality control techniques have been used for production control such test results and relevant charts may be made available along with the material supplied to enable the purchaser to judge the acceptability or otherwise of a lot. In case such information is not available, the following procedure is recommended for judging conformity of a lot with the requirements of this specification.

B-1 SCALE OF SAMPLING

B-1.1 Lot

In any consignment, all the switches of the same size and from the same batch of manufacture shall be grouped together to constitute a lot.

B-1.2 The number of switches to be selected from a lot shall depend upon the lot size and shall be in accordance with col 1 and 2 of Table 1.

B-1.3 These switches shall be selected at random. In order to ensure randomness, the following procedure may be adopted:

Arrange the switches in a systematic manner and starting from any switch count them as 1, 2,.....etc, up to r , r being equal to the integral part of N/n , N being the lot size and n the sample size. Every r th switch shall be included in the sample.

B-2 NUMBER OF TESTS

B-2.1 All the switches selected under B-1.2 shall be subjected to acceptance tests given in 6.1.2.

B-3 CRITERION FOR CONFORMITY

B-3.1 A lot shall be considered as conforming to this specification if, the number of switches out of those tested, failing to satisfy the requirements of any one or more of acceptance tests, does not exceed the corresponding number given in col 3 of Table 1.

**Table 1 Sample Size and Permissible
Number of Defectives**
(Clauses B-1.2 and B-3.4)

Lot Size	Sample Size	Permissible Number of Defectives
(N)	(n)	
(1)	(2)	(3)
101 to 150	8	0
151 to 300	13	0
301 to 500	20	0
501 to 1 000	32	1
1001 and above	50	1

NOTE: — For the lot size up to 100, the sample size shall be as agreed upon between the manufacturer and the purchaser and the lot shall be accepted if there is no defective in the sample.

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